Dock Channel Sequences

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VERSION HISTORY			
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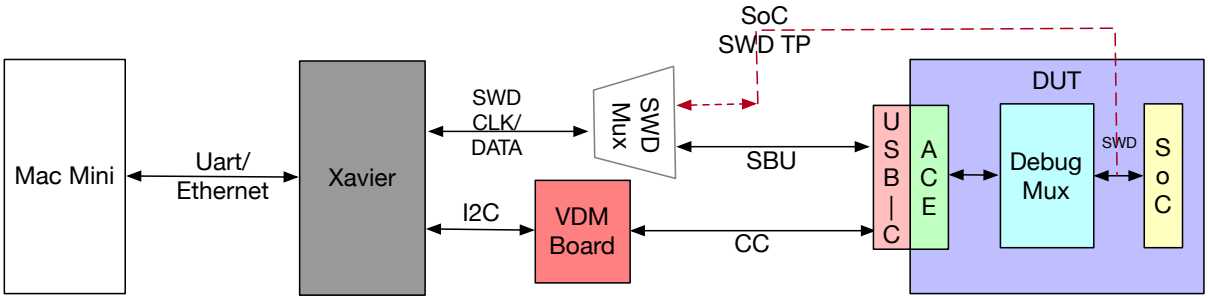
1. Important Notes

- There are 2 implementations of Dock Channels namely PS (bit-banged SWD) and PL (SWD IP) based Dock Channels. For most parts they are identical except at the last stage where the SWD transactions are generated by:
  - Bit-banging GPIOs in the PS version
  - Register read/write to/from the SWD IP in the PL version
- The Dock Channels are accessible via TCP ports 31337 (Diags) & 31339 (SMC)
- The TCP port 31336 is used for runtime configuration of the FW. Most commands sent to this port will only receive smiley ^-^:) prompt as response indicating that the command was sent/scheduled properly. The actual logs will be generated on execution of the command and logs will be received on port 31337. Hence, both ports have to be monitored to ensure completion of the command.
- Dock Channels are enabled during Linux (Xavier) boot-up

2. Dock Channels Connection Options

Dock Channels are accessible in 2 different ways and it is VERY CRITICAL to follow the sequences given below for Dock Channel connection/disconnection for the respective scenario:



2.1. Via SoC SWD Clk/Data Test points

In the picture above, this path is shown by the red dotted lines.
Follow this sequence to connect to the DUT in this mode:

1. At the start of the test sequence, send <restart_dc_manager-ps/pl> command to port 31336 of Xavier to ensure:
   - The FW is in a known state and Dock Channels are enabled
   - The TCP connection from Mac mini to the Dock Channel sockets (31336, 31337, 31339) are established properly. Details in a later section
2. Connect the Xavier SWD Clk/Data pins to the DUT SoC SWD test points
3. Power-up the DUT
4. Dock Channel should be connected and the DUT spew will be seen on port 31337 of Xavier. Successful Dock Channel connection log on port 31337 is as shown below:

```
    enable Dock Channels
    Dock Channel Connected
```

5. At the end of the sequence send <disable_dc> command to port 31336 of Xavier to stop dock channels. Disconnection log on port 31337 is as shown below:

```
disable Dock Channels
```

2.2. Via SBU lines of USB-C Connector

In the picture above, this path is shown via the USB-C interface. To connect Dock Channels via the USB-C interface the Debug Mux on the DUT has to be configured to connect the SoC SWD lines to the SBU lines of the USB-C Connector. This is realized by using the VDM Board to exchange ADVDMs with the DUT.
NOTE: The TPS chip on the VDM board should be configured to present ONLY 5V PD contract to the DUT for Dock Channel communication purposes.

Follow this sequence to connect to the DUT in this mode:

1. At the start of the test sequence, send <restart_dc_manager-ps/pl> command to port 31336 of Xavier to ensure:
   - The FW is in a known state and Dock Channels are enabled
   - The TCP connection from Mac mini to the Dock Channel sockets (31336, 31337, 31339) are established properly. Details in a later section
2. Trigger the ADVDM state machine by sending <enable_advdm> command to port 31336 of Xavier. The ADVDM state machine will wait for a successful PD contract.
3. Connecting to the DUT via the USB-C interface requires making the following connections in this order:
   1. Xavier SWD CLK/DATA pins to the DUT SBU lines of the USB-C connector
   2. VBUS from VDM board to the DUT VBUS line of the USB-C connector
   3. CC lines from VDM board to the DUT CC lines of the USB-C connector. This connection establishes a PD contract and the ADVDM state machine resumes.
4. On successful completion of ADVDMs, Dock Channel are automatically enabled and connected and the DUT spew will be seen on port 31337 of Xavier. Successful Dock Channel connection log on port 31337 is as shown below:

```
VDM board detected: ADVDM Enabled
New PD Contract established!Wait for CC connection
PD Contract established
disable Dock Channels
ADVDM sent
Plug Orientation: 1 usbMisType: 1 usbDbgType: 0 sbuType: 0
SWD Latched & enable Dock Channels
Successfully enteredDC (206)
Dock Channel Connected
```

5. At the end of the sequence send <disable_dc> & <disable_advdm> commands to port 31336 of Xavier to stop dock channels. Disconnection log on port 31337 is as shown below:

```
disable Dock Channels
```

3. Switch Connection Modes

In the test sequence there might a requirement to switch from connecting Dock channels via SoC SWD test points to connecting Dock channels via USB-C interface OR vice-versa. Follow this sequence to ensure safe switching:

1. Stop already running Dock Channels state machine by sending <disable_dc> command to port 31336 of Xavier
2. Make the SWD CLK/DATA connection switch and any other required steps for that mode as described in the previous sections
3. Start Dock Channels by sending <enable_dc> command to port 31336 of Xavier

If the test sequence ends in a different mode as to the one that it started in then follow the remaining part of the sequence associated with the new mode.

4. Switch PL SWD CLK Frequency

The SWD IP based Dock Channels has an option of changing the SWD clock frequency at runtime. Follow this sequence to ensure safe switching:

1. Stop already running Dock Channels by sending <disable_dc> command to port 31336 of Xavier
2. Change the SWD Clock frequency by sending <swd_clk_freq-xxxxxxx> command to port 31336 of Xavier, where the frequency is specified in Hz
3. Start Dock Channels by sending <enable_dc> command to port 31336 of Xavier

5. TCP Connection Check

At the start of the test sequence, it is required to check the TCP connection from Mac mini to the Dock Channel FW on Xavier. Follow these steps to do that:

1. Send the <restart_dc_manager-ps/pl> command to port 31336 of Xavier
2. This command should receive response on ports 31336 and 31337 as shown below

3. If any of the ports (31336 and/or 31337) does not receive a response then reconnect to that port and retry the same command and perform the check again

6. Switch PS<->PL SWD

The driver supports the option of switching between PS & PL SWD at runtime. Follow these steps to do that:

1. Stop already running Dock Channels by sending <disable_dc> command to port 31336 of Xavier
2. Stop ADVDM state machine by sending <disable_advdm> command to port 31336 of Xavier
3. Switch from PS to PL SWD by sending <restart_dc_manager-pl> command to port 31336 of Xavier

OR

4. Switch from PL to PS SWD by sending <restart_dc_manager-ps> command to port 31336 of Xavier
5. Dock Channel should be connected and the DUT spew will be seen on port 31337 of Xavier. Successful Dock Channel connection log on port 31337 is as shown below:

```
Starting application...
enable Dock Channels
```

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